

Application No. 10/789,557

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REMARKS

In the Official Action mailed 5 October 2004, the Examiner reviewed claims 1-21. The Examiner rejected claims 15-21 under 35 U.S.C. §112, second paragraph; rejected claims 1, 2, 3 and 6 under 35 U.S.C. §103(a); rejected claims 8-10, 13 and 15 under 35 U.S.C. §103(a); objected to claims 4, 5, 7, 11, 12 and 14 as being dependent upon a rejected base claim; indicated that claims 16-21 would be allowable if rewritten to overcome the rejections under 35 U.S.C. §112, second paragraph.

Applicant has amended claims 4, 5, 7, 11, 12 and 14, and added claims 22-24. Claims 1-24 are now pending.

The Examiner's rejections and objections are respectfully traversed below.

Rejection of Claims 15-21 under 35 U.S.C. §112, second paragraph

Claims 15-21 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. We note that claims 16-21 depend from claim 15.

The Examiner states that claims 15-21 are incomplete "since no step of laser shock peening is described in the main body of the claim." It is unclear to Applicant why the Examiner considers this fact to make the claim unclear.

Claim 15 includes a statement of intended use in its preamble, which reads "A method for laser shock peening..." There is no legal requirement for the intended use of the method to be stated in the main body of the claim. It is sufficient to support such claim under §112, first and second paragraphs, that the acts recited in the claim, including "delivering the waveform corrected output pulse to the target work piece," result in laser shock peening of the target work piece in embodiments of the invention as described in the specification, and that the specification supports other uses. See, MPEP, § 2111.02, Effect of Preamble; and § 2172.01 Unclaimed Essential Matter.

The present application provides clear support for use for applications other than laser peening, stating for example at page 7, lines 6-7, "The system and components thereof, are particularly useful in laser peening systems, but have many applications in high power laser systems."

Furthermore, the acts recited in the claim completely describe the invention including the generation and delivery of pulses of laser energy to a target work piece, while blocking back

reflections. Thus, Applicant submits that claims 15-21 meet the requirements of 35 USC § 112, second paragraph.

Accordingly, reconsideration of the rejection of claims 15-21 is respectfully requested.

Rejection of Claims 1, 2, 3 and 6 under 35 U.S.C. §103(a)

Claims 1, 2, 3 and 6 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hackel et al. in U.S. Patent No. 5,239,408, in view of Matthews et al. in U.S. Patent No. 5,986,234, and Farmer in U.S. Patent No. 3,724,930.

Claim 1 requires a relay telescope that relays an image from an image location near an output of the laser system, to another image location near target delivery optics. The Examiner cites Hackel et al. to teach a laser system without target delivery optics. The Examiner cites Matthews et al. to teach a laser system with beam delivery optics. Finally the Examiner cites Farmer to suggest a relay telescope with a pinhole, arguing "It would have been obvious to adapt Matthews et al. in view of Farmer to provide this to remove degrading effects caused by dust." Official Action, page 3, lines 5-7.

Matthews et al. teaches beam delivery optics in a workhead 14 in Fig. 1, an embodiment of which is shown in Fig. 6 as noted by the Examiner, that is mounted on a telescoping and articulated arm assembly comprising a number of flat mirrors with articulating arms and telescoping sections therebetween. The workhead 14 on the end includes optics and is adapted to be placed adjacent a target surface. Matthews et al., column 10, lines 61-66. Therefore, the length of the optical path between the laser system and the workhead 14 (Fig. 6) changes in the system of Matthews et al., as it is applied for paint removal or other high-energy operations on a work surface.

The telescope of Farmer is arranged as a spatial filter comprising a pinhole and a beam expander. Farmer does not teach use of the telescope for image relay. There is no mention of "image locations" in the Farmer patent. Farmer describes a telescope system which is used to "clean up" a laser beam as it travels out of a laser system. It consists of a telescope with a very small baffle at focus that allows only a certain fraction of the laser light to pass. The idea of Farmer is to improve the quality of the beam that has become distorted by traveling through air filled with dust with spatial filtering. Farmer is not related to the image relay process described and claimed herein.

The laser system of Matthews et al. and Hackel et al. produces a high-quality output beam, with "near diffraction limited beam quality." (Matthews et al., column 10, lines 42-45; see Hackel et al. column 10, lines 28-29). There is no reason to insert a spatial filter comprising a telescope with a pinhole baffle as taught by Farmer for the purposes of improving beam quality, in a system already providing high-quality beams like Hackel et al. and Matthews et al. There is no suggestion in Farmer that the telescope described therein should be used for relaying an image from an image location near an output of a laser system having high-quality output, to an image location near target delivery optics. The Examiner does not identify a location in this combination of references, at which the telescope of Farmer would be inserted, in order to meet the limitations of claim 1.

With hindsight, one would realize that the pinhole in Farmer would block off angle and out of focus back reflections if added appropriately to the system of Matthews et al. However, as argued above, even if the combination were made, to meet the limitations of the claim, the relay telescope of Farmer would have to be positioned as recited to maintain beam quality emerging at an output of the laser by relay imaging at the target delivery optics. Farmer is not related to relay imaging for maintaining beam quality. Rather Farmer teaches spatial filtering for that purpose. Nothing in the references suggests the relay imaging feature of the claim. The Examiner's *prima facie* case is therefore incomplete.

Therefore, Applicant respectfully disagrees that the combination of Hackel et al., Matthews et al. and Farmer teaches the limitations recited in the claim. In particular, the combination does not teach all limitations in claim 1, including at least the following:

a relay telescope having a telescope focal point in a beam path between the laser system in the target delivery optics which relays an image between an image location near an output of the laser system and an image location near said target delivery optics.

In addition, Applicant disagrees that one would be motivated to modify the teachings of Matthews et al. with the telescope of Farmer. Although Farmer suggest that its telescope would improve beam quality caused by dust, it is not clear where in Matthews et al. the problem of degradation of the beam by dust appears. Therefore, even if the combination would yield the present invention, which it does not, Applicant submits that the Examiner's basis for combining the references is not reasonable.

Applicant notes that claims 2, 3 and 6 depend from claim 1, and are patentable for at least the same reasons, and because of the unique combinations recited. The Examiner does not

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comment specifically on claims 2, 3 and 6. With regard to claim 2, Applicant notes that it requires a second relay telescope, referred to as the "intra-cavity relay telescope" which relays an image from the output of the gain medium to an image location near the output of the laser system. Thus, the "intra-cavity relay telescope" and the relay telescope of claim 1 are arranged in cascade to relay an image of the output of the gain medium. No combination of the references cited suggests this arrangement.

Accordingly, reconsideration of the rejection of claims 1, 2, 3 and 6 is respectfully requested.

Rejection of Claims 8-10, 13 and 15 under 35 U.S.C. §103(a)

Claims 8-10, 13 and 15 are rejected under 35 U.S.C. §103(a) as being unpatentable over Toller et al., U.S. Patent No. 6,127,649, in view of Hackel et al., U.S. Patent No. 5,239,408, and Farmer, U.S. Patent No. 3,724,930. The Examiner cites Toller et al. to teach a robot cell and target delivery optics. The Examiner suggests that the laser system of Hackel et al., combined with the telescope of Farmer and the robot cell in Toller et al. yields the invention claimed in claim 8. Claims 9, 10, 13 depend from claim 8. Claim 15 is an independent method claim, which the Examiner does not mention in the rejection.

As to claim 8, Applicant respectfully disagrees that the combination of Toller et al., Hackel et al. and Farmer teaches the limitations recited in the claim for the reasons argued above with respect to claim 1. In particular, the combination does not teach all limitations in claim 8, including at least the following:

a relay telescope having a telescope focal point in a beam path between the laser system in the target delivery optics which relays an image between an image location near an output of the laser system and an image location near said target delivery optics.

The output of the laser system is not described in Toller et al. The beam delivery optics in Toller et al. consist of turning mirrors 46. The laser system of Hackel et al. produces a high-quality output beam, with "near diffraction limited beam quality." (Hackel et al., Column 10, lines 42-45.) There is no reason to insert a spatial filter comprising a telescope with a pinhole baffle as taught by Farmer for the purposes of improving beam quality, in a system already providing high-quality beams like Hackel et al. There is no suggestion in Farmer that the telescope described therein should be used for relaying an image from an image location near an output of a laser system having high-quality output, to an image location near target delivery

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optics. The Examiner does not identify a location in this combination of references, at which the telescope of Farmer would be inserted, in order to meet the limitations of claim 8.

Claim 8 requires that the baffle be used "to block off angle and out of focus back reflections..." With hindsight, one would realize that the pinhole in Farmer would block off angle and out of focus back reflections if added appropriately to the system of Toller et al. However, as argued above, even if the combination were made, to meet the limitations of the claim, the relay telescope of Farmer would have to be positioned as recited to maintain beam quality emerging at an output of the laser by relay imaging at the target delivery optics. Farmer is not related to relay imaging for maintaining beam quality. Rather, Farmer teaches spatial filtering for that purpose. Nothing in the references suggests the relay imaging feature of the claim. The Examiner's *prima facie* case is therefore incomplete.

With regard to claim 9, Applicant notes that it requires a second relay telescope, referred to as the "intra-cavity relay telescope" which relays an image from the output of the gain medium to an image location near the output of the laser system. Thus, the "intra-cavity relay telescope" and the relay telescope of claim 8 are arranged in cascade to relay an image of the output of the gain medium. No combination of the references cited suggests this arrangement.

Claims 9, 10 and 13 depend from claim 8 and are allowable for at least the same reasons.

Claim 15 is an independent method claim requiring "controlling a pulse width ...", "first ..., second... and third relaying", and other limitations not addressed by the Examiner, and not found in the combination of references.

Accordingly, reconsideration of the rejection of claims 8-10, 13 and 15 as amended is respectfully requested.

Allowable Subject Matter

Claims 4, 5, 7, 11, 12 and 14

Claims 4, 5, 7, 11, 12 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant has amended such claims to incorporate their respective base claims.

Accordingly, reconsideration of the objection to claims 4, 5, 7, 11, 12 and 14 as amended is respectfully requested.

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Claims 16-21

Claims 16-21 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. §112, second paragraph, set forth in this Action, and to include all of the limitations of the base claim and any intervening claims. Applicant has traversed the rejection under 35 U.S.C. §112, second paragraph, above, and submits that such claims are allowable.

New Claims 22-24

New claims 22-24 are supported by the specification as filed at page 24, lines 10-12, and further distinguish over the references cited.

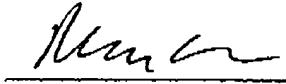
CONCLUSION

It is respectfully submitted that this application is now in condition for allowance, and such action is requested.

The Commissioner is hereby authorized to charge any fee determined to be due in connection with this communication, or credit any overpayment, to our Deposit Account No. 50-0869 (MICI 1003-2).

Respectfully submitted,

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